Draft Purpose and Need

January 31, 2005

This information is being developed as part of the National Environmental Policy Act (NEPA) process. All data presented herein are preliminary and subject to change prior to the public availability of the Tier 1 Draft Environmental Impact Statement. VDOT values public input and comments or questions received about these data will be considered as part of the normal process of public availability for the Tier 1 DEIS.

2

Purpose and Need

The Virginia Department of Transportation (VDOT) and the Federal Highway Administration (FHWA) are studying improvements along the I-81corridor in Virginia to address existing and future transportation deficiencies on the interstate facility. In particular, these deficiencies are related to the need for increased capacity, improved safety, and improved roadway geometrics. The specific needs along I-81 are summarized in the following sections.

2.1 Study Area

Interstate 81 (I-81) is heavily relied upon for both local travel and interstate travel in the eastern United States. It extends 855 miles from Tennessee to New York at the Canadian border. For interstate travel, I-81 is a major trucking corridor since it connects Canada and the more densely populated northeastern United States to the mid-southern states as well as to other routes that connect to the Texas-Mexico border. Figure 2.1-1 provides context for I-81 within the overall interstate system.

Virginia's portion of I-81 is critical to overall national system linkage. Within Virginia, I-81 connects to three major interstate highways including:

- I-77 in Wytheville
- I-64 near Lexington and Staunton
- I-66 near Middletown

I-81 in Virginia runs for 325 miles in a southwest to northeast direction from western Virginia at the Tennessee border north to the West Virginia border. The highway passes through 21 cities and towns and 13 counties. Figure 2.1-2 presents I-81 as it serves the Commonwealth of Virginia.

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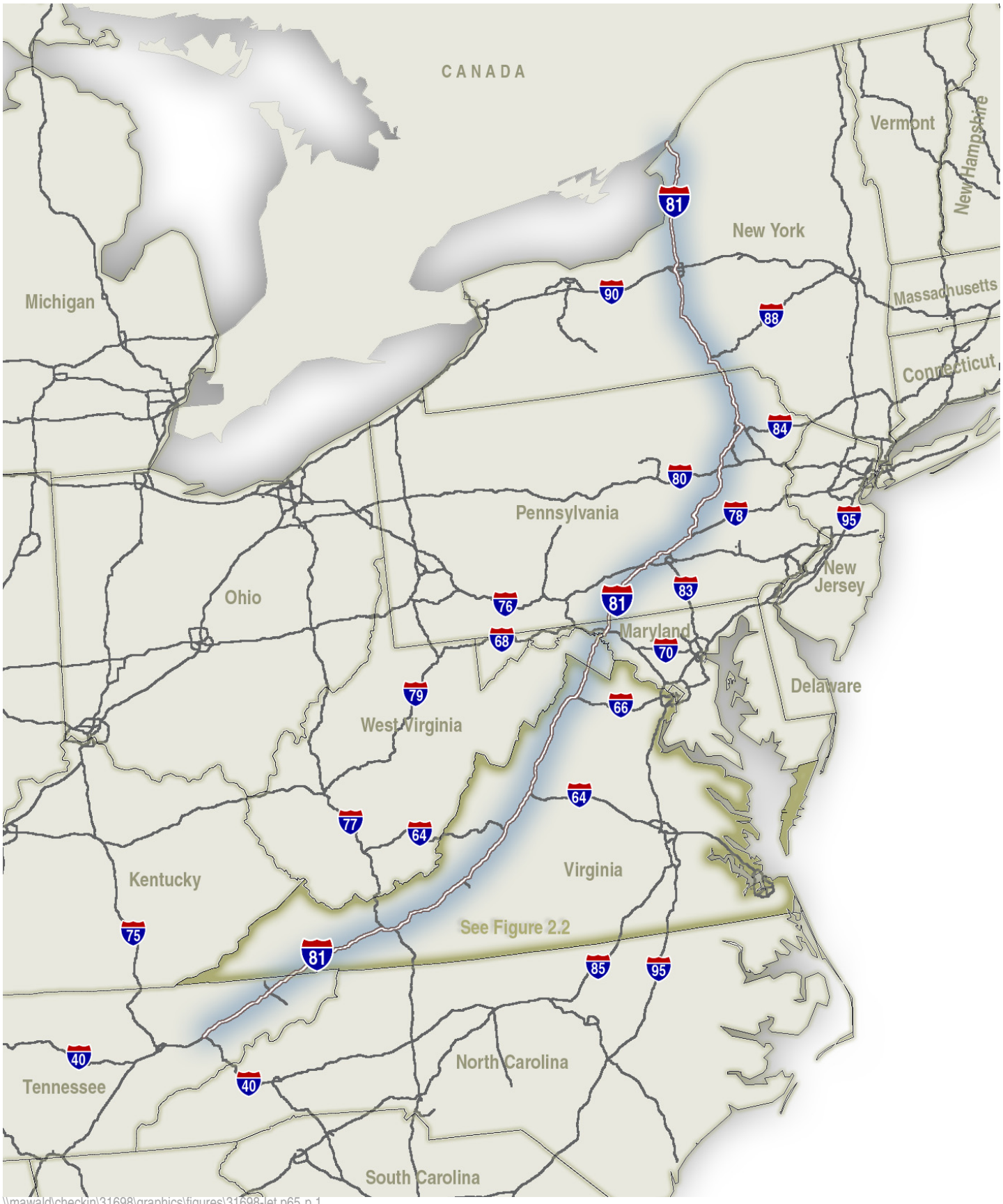

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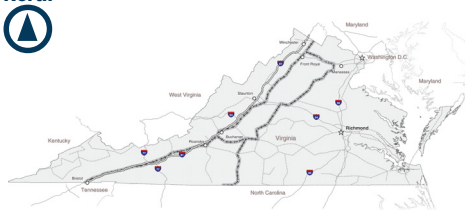
North



I-81 Location in Eastern United States

Figure 2.1-1

Legend

I-81 Corridor

Rail Lines

N

0 5 10 20 Miles

Maryland

West Virginia

Kentucky

Tennessee

North Carolina

Lovettsville
Winchester
Purcellville
Stephens City
Leesburg
Great Falls
Potomac
Strasburg
Middleburg
Reston
Washington, D.C.
Woodstock
Front Royal
66
McLean
Arlington
Bryce Mountain
Gainesville
Alexandria
Manassas
Springfield
New Market
Fort Belvoir
Broadway
Stanley
Woodbridge
Remington
Shenandoah
Culpeper
Aquia Harbour
Harrisonburg
Elkton
Monterey
Madison
Falmouth
Fredericksburg
Dahlgren
Stanardsville
Orange
Colonial Beach
Crimora
Spotsylvania Courthouse
Port Royal
Staunton
Gordonsville
Montross
Craigsville
Bowling Green
Waynesboro
Louisa
Mineral
Tappahannock
Warsaw
Goshen
Charlottesville
Lake Monticello
64
95
Clifton Forge
Scottsville
Ashland
Lexington
Columbia
Wyndham
Kilmarnock
Buena Vista
Mechanicsville
Urbanna
Irvington
Glasgow
81
Amherst
Tuckahoe
West Point
Fincastle
Buchanan
Dillwyn
Bon Air
Richmond
Madison Heights
Lynchburg
Bellwood
Gloucester Courthouse
Blue Ridge
Appomattox
Chester
Glen Lyn
Pocahontas
Bedford
Forest
Timberlake
Rustburg
Farmville
Colonial Heights
Hopewell
Williamsburg
Gloucester Point
Grundy
Vansant
Pearisburg
Bluefield
Salem
Roanoke
Hampden Sydney
Petersburg
Claremont
Yorktown
Poquoson
Jenkins
Clinchco
Blacksburg
Cave Spring
Crewe
Surry
Newport News
Pound
Raven
Tazewell
Christiansburg
Westlake Corner
Alta Vista
Dublin
Pulaski
North Shore
Hurt
Brookneal
Charlotte Court House
Blackstone
Rushmere
Hampton
Honaker
Rocky Mount
Union Hall
Drakes Branch
Victoria
Waverly
Dendron
Wise
Ferrum
Penhook
Greina
McKenney
Wakefield
Smithfield
Coeburn
Fort Chiswell
Floyd
Stony Creek
Ivor
Appalachia
Castlewood
Lebanon
Saltville
Rural Retreat
Atkins
Kenbridge
Alberta
Norfolk
St. Charles
Dryden
Adwolf
Woodlawn
Oak Level
Chatham
Windsor
Portsmouth
Virginia Beach
Nickelsville
Collinsville
Halifax
Chase City
Jarratt
Duffield
Sugar Grove
Martinsville
South Boston
South Hill
Lawrenceville
Jonesville
Abingdon
Troutdale
Galax
Fancy Gap
Boydton
Emporia
Courtland
Franklin
Suffolk
Clinchport
Gate City
Damascus
Patrick Springs
Horse Pasture
Danville
Clarksville
Newsoms
Chesapeake
Ewing
Bloomingdale
Independence
Cana
Virgilina
Boykins
Mount Carmel
Bristol
Sandy Level
Tangier
Saxis
Chincoteague
Bloxom
Parksley
Onley
Painter
Wachapreague
Belle Haven
Nassawadox
Cheriton
Cape Charles

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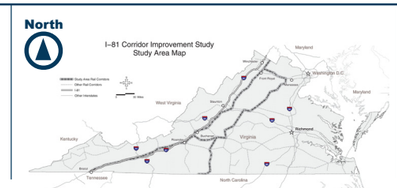

I-81 Location in Virginia

Figure
2.1-2

I-81 CORRIDOR IMPROVEMENT STUDY

For a majority of its length, I-81 runs parallel to U.S. Route 11. In two locations (the I-77 overlap between Interchange 72 and Interchange 81 and between Interchange 167 and Interchange 175), U.S. Route 11 is concurrent with I-81. U.S. Route 11 intersects with I-81 at 23 of the total 91 interchanges. These connections provide local access to rural communities, cities, and towns, such as Bristol, Marion, Wytheville, Christiansburg, Blacksburg, Roanoke, Lexington, Staunton, Harrisonburg, and Winchester. In some instances, U.S. Route 11 also provides an alternate route of travel.

The I-81 study area includes the corridor along the entire length of I-81 in Virginia (See Figure 2.1-3). The corridor ranges in width depending on the resource being described, but is generally 500 feet on either side of the I-81 edge of pavement. Cultural and visual resources, and economic characteristics are described beyond that distance as described in their respective sections in Chapter 4, *Affected Environment*.

Since improvements are being considered along I-81 and Norfolk Southern's (NS's) Piedmont and Shenandoah rail lines, and since these transportation facilities are geographically distant from each other for most of their length, a separate rail study area was also created. Because rail improvements are only being proposed in certain sections, the rail study area consists of 13 discrete segments along existing Norfolk Southern's Piedmont and Shenandoah rail lines in Virginia (see Figure 2.1-3). For each rail segment, resources were generally identified within 500 feet on either side of the rail centerline.

2.2 History

Construction of I-81 in Virginia began in December 1957 and was completed in 1971. Traffic demands in 1978 ranged from 13,800 to 24,700 vehicles per day (see Table 2-1). Over the 25 years following 1978, travel demands have more than doubled and nearly tripled in some locations with average annual daily traffic in 2003 ranging from 34,300 to 57,100 vehicles per day, with a considerable portion of this traffic being heavy vehicles (9,200 to 13,500 trucks per day).

Beginning in the spring of 1996 and concluding in the fall of 1998, VDOT conducted a review of the entire 325-mile corridor by dividing it into ten concept study areas. The studies evaluated safety, traffic operations, and geometric conditions; forecasted future traffic demands; and identified preliminary improvements.

In January 2002, a consortium of design and construction firms, STAR Solutions (STAR), submitted an unsolicited proposal to VDOT, under the Commonwealth's Public-Private Transportation Act (PPTA), to upgrade the I-81 corridor. The PPTA process, which is the result of state legislation passed in 1995, allows VDOT to partner with the private sector to improve transportation infrastructure.

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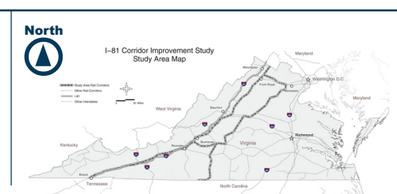

I-81 and Rail Study Areas

Figure 2.1-3

I-81 CORRIDOR IMPROVEMENT STUDY

VDOT subsequently solicited new PPTA proposals for I-81 improvements. STAR submitted a revised proposal and a second consortium, led by Fluor Virginia, Inc., also submitted a proposal. In March 2004, VDOT's Commissioner directed VDOT to enter into negotiations with STAR as the potential operator under the PPTA. Even though VDOT is negotiating with STAR, no decisions on the improvement concepts have been made. The final decision on the improvement concept to be advanced for I-81 will not be made until the conclusion of the Tier 1 NEPA process.

In March 2003, VDOT applied for approval to toll I-81 in Virginia under Section 1216(b) of the Transportation Equity Act for the 21st Century. In March 2003, FHWA granted conditional provisional approval of VDOT's application.

On April 2, 2004, representatives of the Departments of Transportation for West Virginia, Pennsylvania, Tennessee, and Maryland were coordinated with to determine the influence of roadway projects in those states on the I-81 corridor. Each state submitted historical traffic counts and future traffic forecasts to the study team, as well as improvement concepts under study, including roadway widening and tolling options currently being considered.

In September 2004, VDOT spearheaded and hosted the I-81 Corridor Multi-State Forum, a meeting attended by a group of transportation officials representing the states that I-81 traverses (Tennessee, Virginia, West Virginia, Maryland, Pennsylvania and New York). Each state was invited to present and discuss highway and rail initiatives in their state; to share information on their respective transportation challenges and on their opportunities for meeting those challenges; and to share information on current studies along I-81 in their state.

Meetings also were held several times in 2004 with the Virginia Department of Rail and Public Transportation (DRPT) and Norfolk Southern to obtain available information pertinent to the rail component of the I-81 Corridor Improvement Study and to discuss the proposed rail concepts. Coordination also occurred with the Federal Railroad Administration (FRA) to discuss modeling assumptions to use for predicting truck-to-rail diversion (also see Chapter 7, *Comments and Coordination*).

2.3 Existing Conditions

Existing conditions were identified using existing data, as well as new data, gathered as part of the I-81 Corridor Improvement Study. Existing data were collected and analyzed to define the existing conditions and establish a benchmark of comparison for 2035 No-Build conditions. The traffic information was collected in the field by the study team in the year 2004. The crash data analyzed were from the three-year period of 2000 to 2002; and the existing geometric deficiencies were identified from field visits, aerial photography, and a

review of the construction plans for the most recently completed projects along the entire facility.

2.3.1 Traffic Volumes and Historic Growth

Several data sources were used to determine growth rates as described in detail in the *I-81 Corridor Improvement Study Transportation Technical Report.* Of the data available, VDOT historical count data were determined to be the most reliable for use in forecasting future conditions. These data show 2.1 percent annual growth from 1978 to 2003 and 1.8 percent growth from 1997 to 2003. Based on these trendlines, a range of growth rates (between 1.8 and 2.1 percent) were used to forecast from 2003 to the 2035 design horizon. These historic data were supplemented with information on population and employment found in the Virginia Statewide Model to determine which growth rates were applied to specific sections of the corridor. Table 2.3-1 shows historical as well as current traffic volumes and growth along I-81. These data were used in subsequent analysis of existing conditions.

Table 2.3-1 Existing Traffic and Historical Traffic Volume Growth Along I-81: 1978-2003

					1978 – 2003		1997 – 2003	
Location (from South to North) [A]	1978 AADT Volume [B]	1997 AADT Volume [C]	2003 AADT Volume [D]	2003 Truck Percentage [E]	Average Annual Growth Rate [F]	Aggregate Growth [G]	Average Annual Growth Rate [H]	Aggregate Growth [I]
Route 140 to South Corporate Limit of Abingdon	18,100	37,000	41,000	23%	3.3%	127%	2.1%	11%
Route 11 to North Corporate Limit of Wytheville (I-77 overlap)	21,400	46,800	51,900	26%	3.6%	143%	1.7%	11%
Route 177 to Route 8 (near Radford)	15,400	32,000	41,000	27%	4.0%	166%	4.2%	28%
Route 581 to Route 115 (Roanoke)	24,700	52,000	57,100	21%	3.4%	131%	1.6%	10%
Route 11 to Route 11-614 (Buchanan)	14,900	30,000	34,300	35%	3.4%	130%	2.3%	14%
Route 606 to Augusta County Line (I-64 overlap)	15,300	33,000	41,700	32%	4.1%	173%	4.0%	26%
Route 11 to Route 659 (Harrisonburg)	16,700	39,000	48,000	27%	4.3%	187%	3.5%	23%
Route 50 to Route 7	18,900	48,000	56,200	21%	4.5%	197%	2.7%	17%
Overall Corridor Average	18,200	39,725	46,400	26%	3.8%	155%	2.7%	17%

A – Each section contains a continuously monitored permanent count station
B – Annual Average Daily Traffic (AADT) on weekdays for the year 1978
C – AADT on weekdays for the year 1997
D – AADT on weekdays for the year 2003
E - Percent of 2003 AADT that are trucks

F – Average rate of traffic growth (compounded) experienced per year between 1978 and 2003
G – Total percent increase of 2003 average daily traffic as compared to 1978 average daily traffic
H – Average rate of traffic growth (compounded) experienced per year between 1997 and 2003
I – Total percent increase of 2003 average daily traffic as compared to 1997 average daily traffic

Because of the noticeable change in the average annual growth rates that has occurred during the past few years, the rates for the overall 25-year period and the rates for the last seven years are shown separately. The rates were also shown separately because 1997 is the year the automated count stations along I-81 became operational; therefore, data from 1997 to 2003 is based on more accurate and continuous counting methods than the rates in years prior to 1997.

Freight statistics, surveys, and field observations were analyzed to determine the local, regional, and through truck percentages. This information is provided in the accompanying *I-81 Corridor Improvement Study Transportation Technial Report*. For 2003, truck percentage was an average of 26 percent of the traffic at the eight permanent count stations along I-81.

2.3.2 Levels of Service

Traffic operating conditions along I-81 were evaluated with respect to the existing highway infrastructure to assess the overall quality of traffic flow using the procedures documented in the 2000 Highway Capacity Manual (HCM)[1]. A level of service (LOS) analysis was conducted for the mainline of I-81 as well as for all ramp merges, diverges, and weave areas. LOS is a qualitative measurement of the operating conditions that takes into account a number of variables such as speed, vehicle maneuverability, and traffic interruptions. A letter grade ranging from LOS A (representing the free flow of traffic) to LOS F (representing a forced or breakdown in traffic flow) is assigned to each location. The American Association of State Highway and Transportation Officials (AASHTO) document *A Policy on Geometric Design of Highways and Streets* is referenced in the Code of Federal Regulations and is used to provide the LOS standard for highways on the National Highway System, which includes I-81. In rural areas of I-81, the standard for the mainline is LOS B, and the standard for the ramps and weave areas (the crossing of two or more traffic streams traveling in the same direction along a significant length of highway) in Virginia is LOS C. In urban areas of I-81, the standard for the mainline as well as the ramps and weave areas is LOS C. Figure 2.3-1 shows existing levels of service along the corridor. The major findings of the existing level of service analysis are:

Mainline

- In the northbound direction, 24 miles (7 percent) of I-81 operate below the level of service standard.
- In the southbound direction, 32 miles (10 percent) of I-81 operate below the level of service standard.

1 *2000 Highway Capacity Manual*; Transportation Research Board, National Research Council; Washington D.C. 2000

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0 11 22 Miles

West Virginia

Kentucky

Tennessee

Virginia

Winchester
Frederick County
Clarke County
Loudoun County
Fairfax County
Fairfax
Warren County
Shenandoah County
Fauquier County
Manassas Park
Prince William County
Rappahannock County
Page County
Rockingham County
Harrisonburg
Culpeper County
Madison County
Stafford County
Highland County
Augusta County
Greene County
Fredericksburg
Orange County
Staunton
Spotsylvania County
Waynesboro
Charlottsville
Caroline County
Bath County
Louisa County
Rockbridge County
Albemarle County
Fluvanna County
Hanover County
Clifton Forge
Covington
Lexington
Nelson County
Alleghany County
Buena Vista
Goochland County
Botetourt County
Amherst County
Buckingham County
Powhatan County
Richmond
Cumberland County
Henrico County
Craig County
Roanoke
Bedford County
Lynchburg
Chesterfield County
Bedford
Appomattox County
Giles County
Amelia County
Montgomery County
Salem
Campbell County
Prince Edward County
Petersburg
Buchanan County
Bland County
Christiansburg
Nottoway County
Dinwiddie County
Dickenson County
Tazewell County
Wise County
Norton
Wytheville
Pulaski County
Charlotte County
Russell County
Franklin County
Lunenburg County
Marion
Floyd County
Sussex County
Wythe County
Pittsylvania County
Halifax County
Greensville County
Lee County
Scott County
Smyth County
South Boston
Brunswick County
Washington County
Carroll County
Patrick County
Martinsville
Mecklenburg County
Emporia
Grayson County
Galax
Henry County
Danville

66 81 64 64 95 77 77 81 85

Level of Service

- A/B
- C Urban
- C Rural
- D
- E/F
- 4 Lane Cross-Section
- 6 Lane Cross-Section

2004
Mainline Levels of Service

I-81 Northbound and Southbound
2004 Existing Traffic Volumes

Figure
2.3-1

I-81 CORRIDOR IMPROVEMENT STUDY

Ramps and Weave Areas

- In the northbound direction, 2 of the 189 ramps (1 percent) serving I-81 in Virginia operate below the level of service standard.
- In the southbound direction, 2 of the 192 ramps (1 percent) operate below the level of service standard.
- None of the ten weave areas along I-81 (five northbound and five southbound) operate below the level of service standard.

2.3.3 Speeds

The overall average travel speed on I-81 is currently 69 miles per hour (mph). The 85th percentile speed (that speed at or below which 85 percent of vehicles are moving) is 71 mph in the southbound direction and 72 mph in the northbound direction. These speeds all exceed the posted speed limits which vary from 55 to 65 mph throughout the length of I-81, meaning that conditions along I-81 do not currently impede traffic flow. In 2035, the projected average No-Build speeds (54 mph) are well below the 85th percentile which is an indication of increased congestion in the future. For more information on existing and future speed conditions, see the accompanying *I-81 Corridor Improvement Study Transportation Technical Report.*

2.3.4 Safety

Safety was analyzed along I-81 to determine if the traffic demands, combined with the geometric conditions of the highway or its ramps, have resulted in unsafe operating conditions. VDOT safety data for the three year period from January 2000 to December 2002 were analyzed as part of this study. The following section summarizes this safety data. The detailed analysis can be found in the *I-81 Corridor Improvement Study Transportation Technical Report.*

The I-81 weighted crash score is less than the 2002 statewide weighted crash score for interstate highways in Virginia (a weighted crash score of 160 per 100 million vehicle miles of travel for I-81 versus a weighted crash score of 277 per 100 million vehicle miles of travel for the average interstate in Virginia). Crashes are scored as: one point for property damage only; 8 points for crashes involving injuries; and 20 points for crashes involving a fatality.

Specific segments that were identified with weighted crash scores more than double the statewide weighted crash score include:

- Mileposts 73-74 northbound (Wytheville)
- Mileposts 94-95 northbound (Pulaski)
- Mileposts 162-163 northbound (south of Buchanan)
- Mileposts 168-169 northbound (north of Buchanan)

- Mileposts 180-181 northbound (north of Natural Bridge)
- Mileposts 292-293 northbound (south of Strasburg)
- Mileposts 314-315 northbound (Winchester)
- Mileposts 49-48 southbound (north of Marion)

All of the above segments are also 25 percent higher than the statewide average. In addition to these, the following segments were identified with weighted crash scores more than 25 percent higher than the statewide weighted crash score:

- Northbound Direction: Mileposts 7-8; 16-17; 23-24; 45-46; 49-50; 80-81; 105-106; 109-110; 156-157; 181-182; 189-90; 195-196; 213-214; 223-224; 252-253; and 296-298
- Southbound Direction: Mileposts 319-318; 315-314; 300-299; 285-284; 275-274; 249-246; 206-205; 203-202; 197-96; 171-169; 151-150; 122-121; 95-94; 68-67; 44-43; 35-34; and 8-7

A total of 21 percent of all crashes and 33 percent of all fatal crashes occur within segments totaling 45 miles in the corridor (all of the combined areas above which constitute 8 percent of the 650 total corridor miles – 325 northbound and 325 southbound). The review of I-81 crash history over the three-year period from 2000 to 2002 also did not show a disproportionately high involvement of trucks in crashes. Trucks constitute approximately 29 percent of all vehicle miles traveled and were involved in approximately 29 percent of all reported crashes and 29 percent of all fatal crashes.

2.3.5 Geometric Deficiencies

The geometric deficiencies of the roadway are contributing factors to some crashes along I-81. Sections of I-81 are more than 40 years old and do not meet current geometric design criteria. Geometric deficiencies include inadequate vertical clearance, inadequate sight distance, the absence of truck climbing lanes, inadequate shoulder width, and inadequate acceleration and deceleration lanes. A detailed review of the existing geometric conditions was completed as part of the previous I-81 concept studies. These studies, combined with a field corridor review performed as part of this study, found that:

- More than two-thirds of I-81 in Virginia have inadequate inside shoulder widths based on the volume of heavy vehicles using I-81;
- More than 100 locations of insufficient sight distances exist because of the alignment of the highway;
- Ten locations along the corridor (extended sections with no relief from a minimum 2 percent grade) along I-81 in Virginia warrant truck climbing lanes including a 12-mile segment northbound from approximately Milepost 190 to 202; and,
- Approximately 53 bridges (42 percent) over I-81 have substandard vertical clearance.

In addition to the above findings, numerous geometric deficiencies have been noted at existing interchanges. Table 2.3-2 shows interchange area deficiencies that were identified by the earlier preliminary engineering studies (Anderson and Associates, 1998 and 1999; HDR Engineering, 1998; HSMM, 1998; Mattern and Craig/PBSJ, 1998; Michael Baker, 1998; Whitman, Requart and Associates, 1998; Wiley and Wilson, 1998) and VDOT Staunton District staff. This list is not meant to be all-inclusive and additional interchange geometric deficiencies are likely.

These geometric conditions, when combined with the traffic demands placed on I-81 (including substantial truck traffic), may contribute to the perception of safety problems along I-81 that was documented by numerous comments received during scoping. (The highway was designed for 15 percent truck traffic but currently experiences truck traffic that comprises 21 to 35 percent of total daily traffic).

Table 2.3-2 Existing I-81 Interchange Geometric Deficiencies

Deficiency	Number of Locations	InterchangeNumbers[1]
Insufficient ramp geometry and/or length	10	35, 39, 47, 50, 67,70,80,126, 251, 291
Insufficient ramp termini spacing on side road	23	24, 26, 29, 32, 35, 39, 45, 47, 60, 80, 84, 86, 89, 92, 109, 205, 243, 245, 273, 302, 307, 310, 313
Insufficient weaving distance between northbound ramps	2	14, 94
Insufficient weaving distance between southbound ramps	4	247, 220, 221, 222
Insufficient stopping sight distance on ramps	3	67, 296, 302
Steep ramp grade (greater than 8% grade)	1	45
Low ramp design speed (less than 25 mph)	3	41, 72, 81
Insufficient tapers, acceleration and/or deceleration lane lengths	12	132, 137, 140, 141, 143, 146, 156, 162, 167, 168, 180, 323
Substantial ramp delay and backup	4	150, 205, 247, 313
Left-hand exit ramp safety issues	4	143, 180, 191, 300
Insufficient ramp geometry at rest area	2	Northbound Milepost 129.3, Southbound Milepost 158

1 More detailed information on the specific locations of these deficiencies is provided in the *I-81 Corridor Improvement Study Transportation Technical Report*

2.4 Future Conditions

Independent of any action, traffic demands along the I-81 corridor are expected to continue to grow. A number of forecasts have been completed for the I-81 corridor over recent years. These sources, as well as historical traffic count data and recent land use projections, were compiled and reviewed as part of this study to determine a future year (2035) forecast for I-81. The year 2035 was selected because it is envisioned that the improvements that emerge from this study may take at least 10 years to complete and, per FHWA requirements, should have a useful life of at least 20 years beyond completion. A detailed description of the forecast methodology is presented in the *I-81 Corridor Improvement Study Transportation Technial Report*.

2.4.1 Projected Traffic Volumes

Tables 2.3-3 and 2.3-4 on the following pages show traffic growth rates and projections for I-81. It includes data used in developing projections of the 2035 No-Build condition. The 2035 No-Build condition assumes that only those roadway projects identified for construction in the constrained Long Range Transportation Plans throughout the corridor and the Six-Year Improvement Program will be built. Additional details on anticipated growth in freight movements along the I-81 corridor and its resultant effect on future truck traffic can be found in the *I-81 Corridor Improvement Study Transportation Technical Report*.

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Table 2.3-3 Projected Total Traffic Volume Growth along I-81: 2004-2035

Location (from south to north)[A]	Milepost Range	2004 AADT Volume [B]	2035 AADT Volume [C]	2035 AADT Truck Percentage [D]	Average Annual Growth Rate [E]	Aggregate Growth [F]
Route 140 to South Corporate Limit of Abingdon	15 to 17	42,100	74,400	30%	1.9%	77%
Route 11 to North Corporate Limit of Wytheville (I-77 overlap)	73 to 76	54,100	100,000	34%	2.0%	85%
Route 177 to Route 8 (near Radford)	109 to 114	42,900	77,800	35%	1.9%	81%
Route 581 to Route 115 (Roanoke)	144 to 147	58,800	114,100	26%	2.2%	94%
Route 11 to Route 11/614 (Buchanan)	168 to 174	35,600	63,000	45%	1.9%	80%
Route 606 to Augusta County Line (I-64 overlap)	205 to 213	42,900	77,700	42%	1.9%	81%
Route 11 to Route 659 (Harrisonburg)	244 to 246	49,400	91,000	33%	2.0%	84%
Route 50 to Route 7	314 to 316	58,500	109,000	26%	2.0%	86%
Overall Corridor Average		48,000	88,400	33%	2.0%	84%

A – Each section contains a continuously monitored permanent count station
B – AADT on weekdays for 2004 based on counts collected for this study
C – AADT on weekdays for 2035 as projected for this study
D - Percent of 2035 AADT that are trucks
E – Average rate of traffic growth per year (compounded) projected to be experienced between 2004 and 2035
F – The total projected percent increase of 2035 average daily traffic on weekdays as compared to 2004 average daily traffic.

Table 2.3-4 shows growth rates and projections for trucks in the I-81 corridor.

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Table 2.3-4 Projected Truck Traffic Volume Growth along I-81: 2003-2035

I-81 Segment [A]	2003 AADT Trucks[B]	2035 AADT Trucks[C]	Average Annual Growth Rate [D]	Aggregate Growth [E]
Route 140 to South Corporate Limit of Abingdon	9,180	22,310	2.8%	143%
Route 11 to North Corporate Limit of Wytheville(I-77 overlap)	13,450	33,970	2.9%	153%
Route 177 to Route 8 (near Radford)	11,240	27,120	2.8%	141%
Route 581 to Route 115 (Roanoke)	11,990	30,210	2.9%	152%
Route 11 to Route 11-614 (Buchanan)	11,970	28,130	2.7%	135%
Route 606 to Augusta County Line(I-64 overlap)	13,480	32,750	2.8%	143%
Route 11 to Route 659 (Harrisonburg)	12,870	30,330	2.7%	136%
Route 50 to Route 7	11,850	28,220	2.7%	138%

A – Each section contains a continuously monitored count station
B – AADT for trucks in 2003 based on counts collected for this study
C – AADT for trucks in 2035 as projected for this study
D – Average rate of traffic growth per year (compounded) for trucks projected to be experienced between 2003 and 2035
E – Total percent increase of 2035 average daily truck traffic as compared to 2003 average daily truck traffic

2.4.2 Levels of Service

Analyses of the 2035 traffic operating conditions were conducted and results are presented in Figure 2.3-2. As can be seen, the vast majority of I-81 (over 90 percent) is expected to operate below the level of service (LOS) standards. Areas of significant congestion include the cities of Blacksburg, Christiansburg, Roanoke, Staunton, Harrisonburg, and Winchester.

2.4.3 Safety

Safety is a problem in some locations today and is expected to worsen by 2035 as volumes increase, the operating conditions deteriorate, and the existing geometric deficiencies remain.

2.5 Summary

Improvements to I-81 are needed to address existing and future capacity, safety, and geometric deficiences on I-81 as summarized below.

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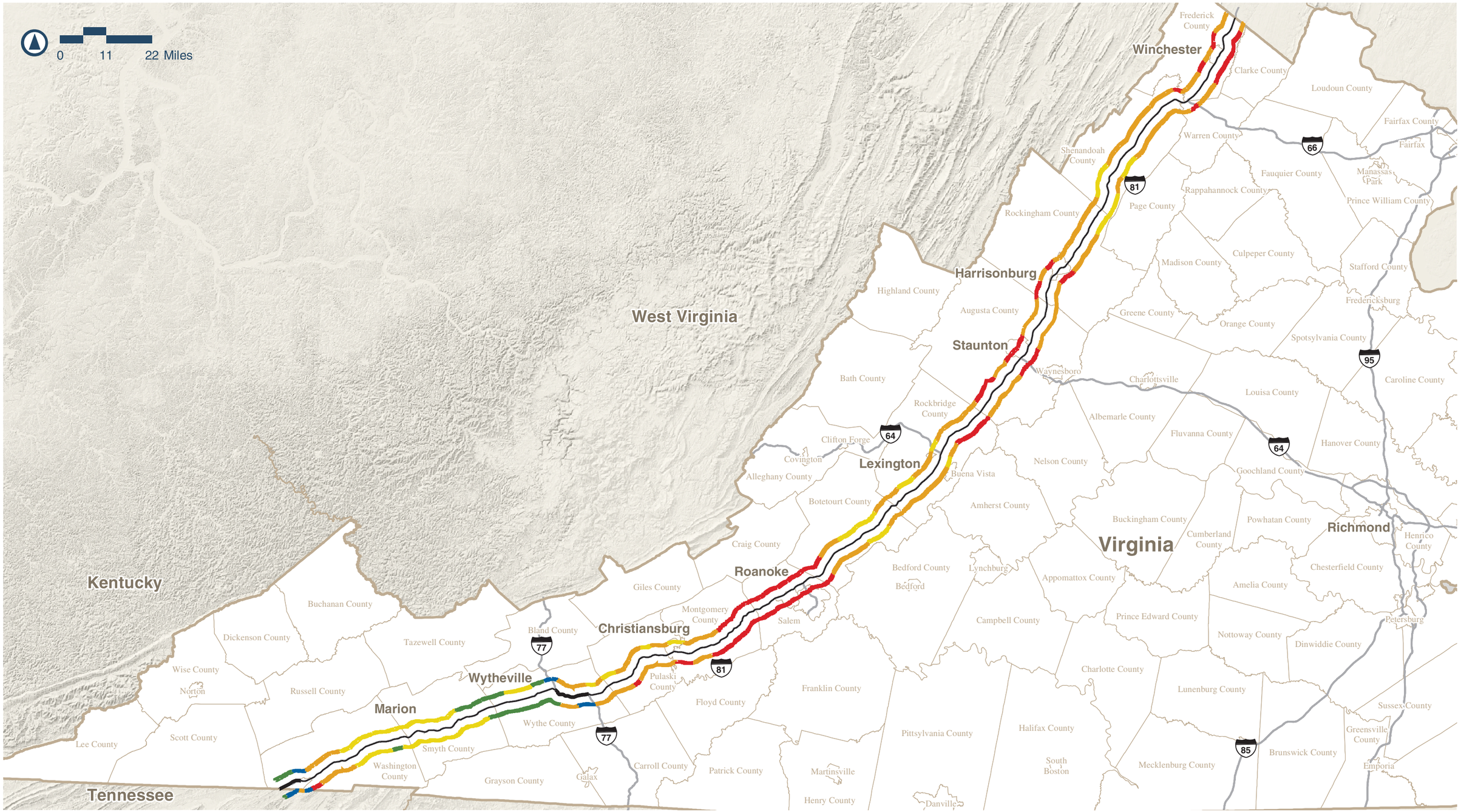
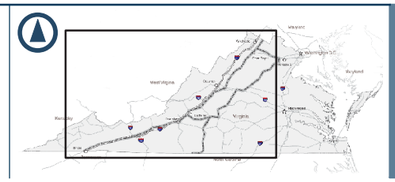


Level of Service

- A/B
- C Urban
- C Rural
- D
- E/F

- 4 Lane Cross-Section
- 6 Lane Cross-Section



2035
Mainline Levels of Service

I-81 Northbound and Southbound
2035 Future Traffic Volumes

Figure
2.3-2

I-81 CORRIDOR IMPROVEMENT STUDY

2.5.1 Existing Conditions on the I-81 Corridor

1. 24 northbound miles operate below LOS standards (Figure 2.3-1).
2. 32 southbound miles operate below LOS standards (Figure 2.3-1).
3. 8 miles (7 northbound and 1 southbound) experience more than twice the statewide weighted crash score.
4. 24 northbound miles experience crash rates more than 25 percent higher than the statewide weighted crash score. This includes the 7 northbound miles that are twice the statewide weighted crash score.
5. 21 southbound miles experience crash rates more than 25 percent higher than the statewide weighted crash score. This includes the 1 southbound mile that is twice the statewide weighted crash score.
6. 21 percent of all crashes and 33 percent of all fatal crashes occur within segments totaling 45 miles in the corridor (the areas listed in Items #4 and #5 which constitute 8 percent of the 650 total corridor miles – 325 northbound and 325 southbound).
7. Trucks constitute 29 percent of the total vehicle miles traveled on I-81 between 2000 and 2002, and trucks were involved in 29 and 29.6 percent of all crashes and fatal crashes, respectively.
8. More than two-thirds of I-81 in Virginia has inadequate inside shoulder width based on the volume of heavy vehicles using the roadway.
9. More than 100 locations of insufficient sight distances have been identified because of the vertical alignment of the highway.
10. Ten extended highway segments with no relief from a minimum 2 percent grade warrant truck climbing lanes, including a 12-mile segment northbound from approximately Milepost 190 to 202.
11. Approximately 53 bridges of the 126 bridge underpass locations have substandard vertical clearance based on AASHTO design criteria.
12. 2003 average truck percentage is 26 percent of the traffic at the eight permanent count stations along I-81.

2.5.2 Projected 2035 Conditions

1. 295 northbound miles (91 percent) operate below LOS standards (Figure 2.3-2).
2. 299 southbound miles (92 percent) operate below LOS standards (Figure 2.3-2).
3. Safety and geometric problems associated with Items #3 through #11 above also will exist in the future condition.
4. 2035 average truck percentage is 33 percent of the projected traffic at the eight permanent count stations along I-81.

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